

FINAL REPORT ABSTRACT

The research findings described in this report confirm that four-component oceanbottom-cable (4-C OBC) seismic data provide valuable information about stratigraphy, lithofacies, and mechanical properties of sediments that cannot be extracted from conventional cable-towed P-wave marine seismic data. The key advantages of 4-C OBC data documented in this study that need to be considered for gas-hydrate applications are

1. the ability to image inside gas-hydrate P-wave wipeout zones with C waves;
2. the increase in stratigraphic information that results from combining P-wave stratal surfaces, seismic sequences, and seismic facies with C-wave stratal surfaces, sequences, and facies;
3. the increased spatial resolution of shallow seafloor strata that results when the time coordinates of C-wave data are warped (transformed) to P-wave imagetime coordinating;
4. the mapping of lithofacies distributions using the lithofacies-sensitive velocity ratio, V_p/V_s ; and
5. the estimation of the spatially averaged mechanical strength of ocean-floor strata using interval values of V_p and V_s to calculate elastic moduli.

These technical advantages of 4-C OBC data will be discussed and illustrated in the main text of the report. Geologic and geophysical details developed during the investigation have been placed in appendices. The impact of the research findings can be understood by concentrating on the main text and ignoring the appendices. However, the appendices are important in that they document critical information and principles.